ScienceWorks

The Human Body: Circulation and Respiration

HUMAN BODY CIRC. AND RESPIRATION 9595
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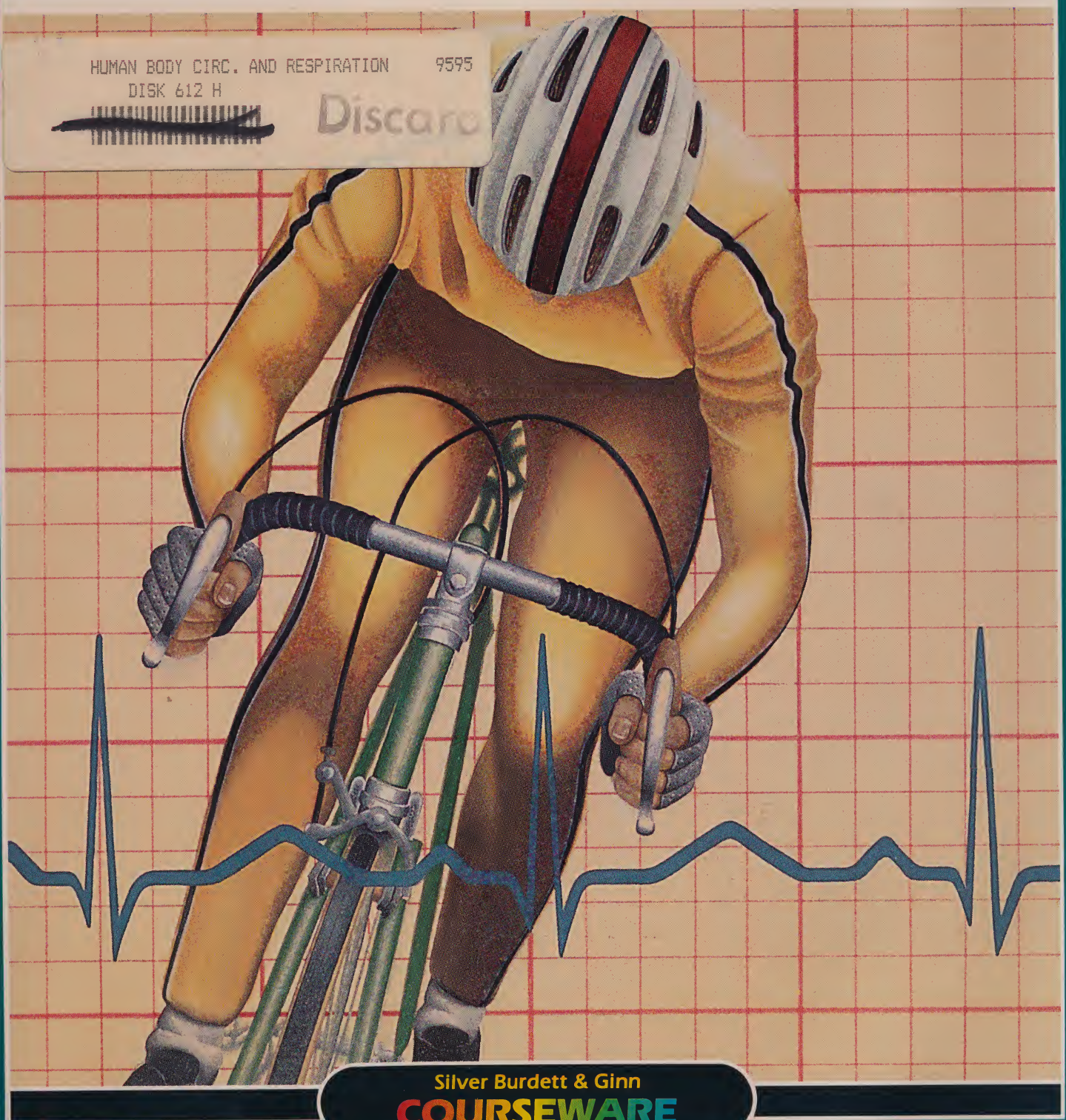

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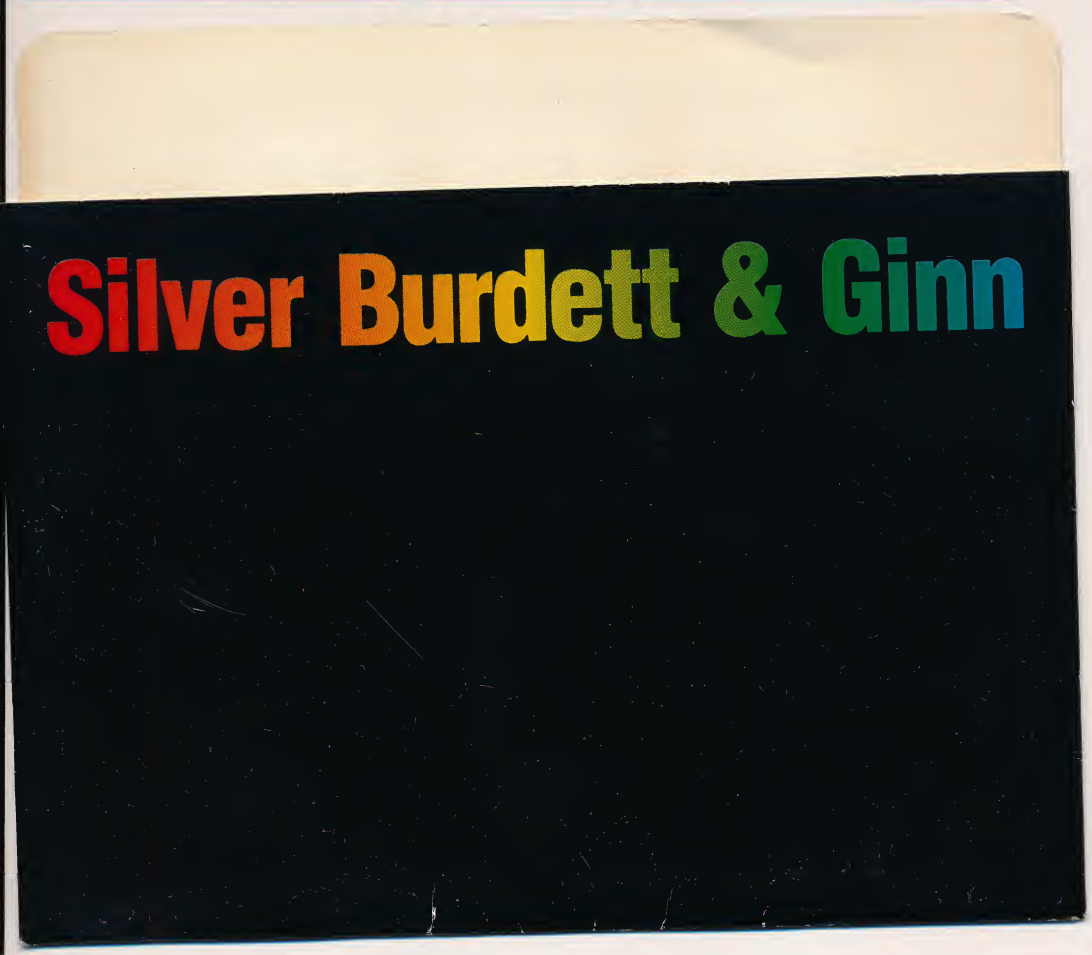
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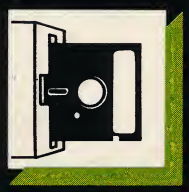
Keep disk in envelope when not in use.

Do not bend disk. Use only a felt pen to write on disk label.

Do not touch exposed surfaces of disk.



Insert disk carefully into disk drive.

Protect disk from extreme heat or cold.

Keep disk away from magnetic fields.

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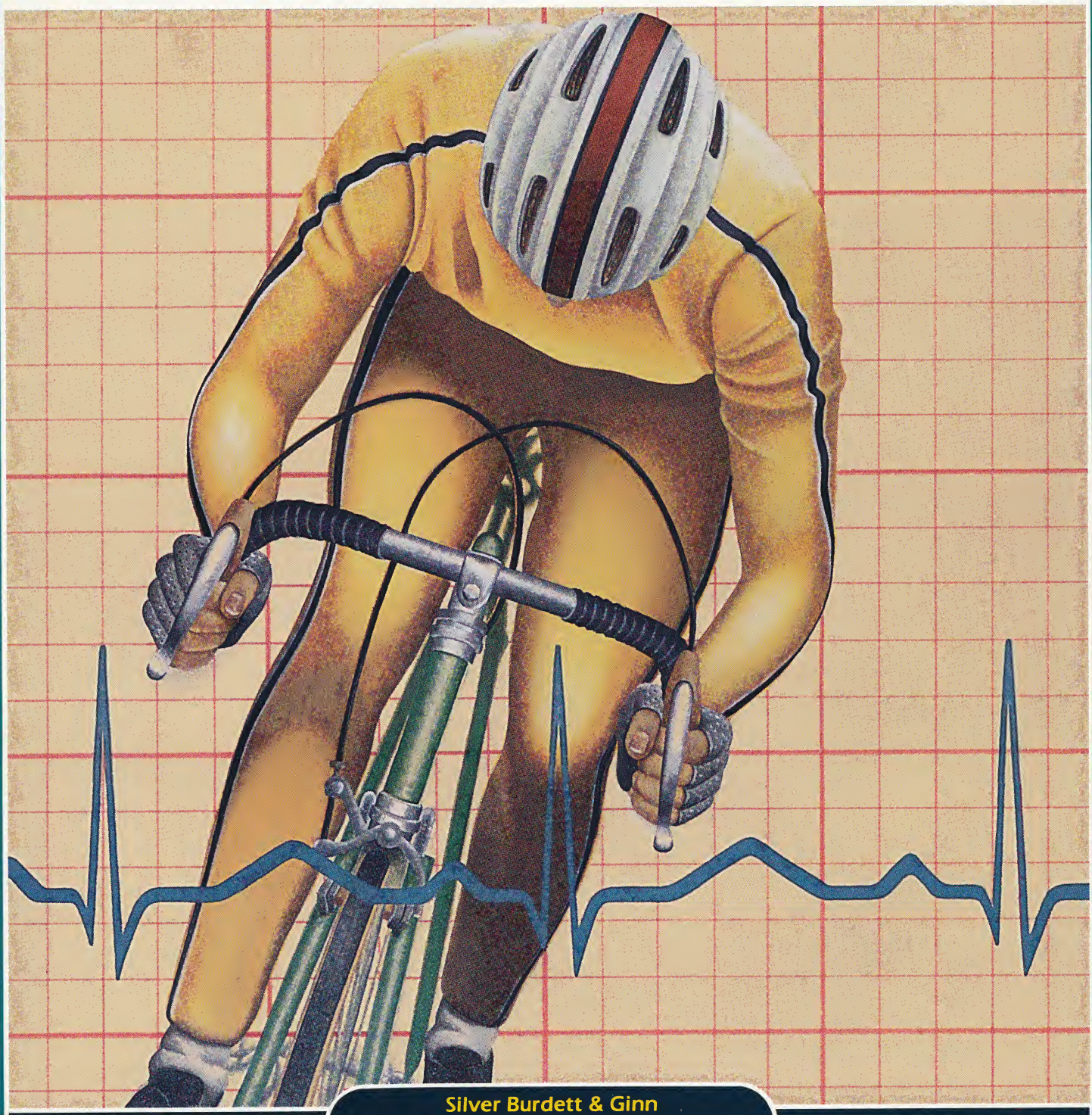

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Developed with John Boeschen & Co. and Learning Quest, Inc.

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TO THE TEACHER

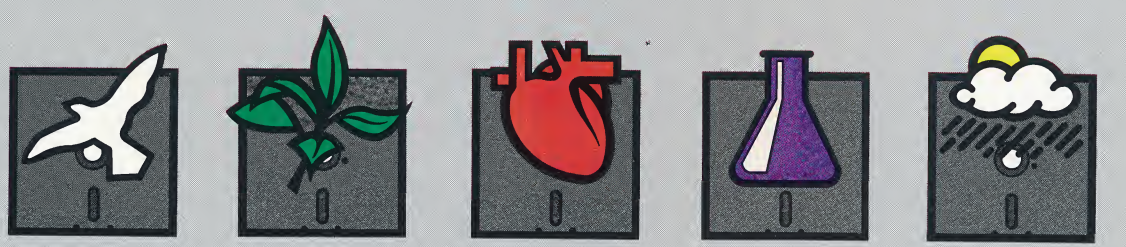
Congratulations! You've found the science program that you've been looking for!

SILVER BURDETT & GINN SCIENCEWORKS provides review and extension of basic science concepts. This courseware can also serve as a valuable tool in introducing science concepts to students with little or no background in this area.

The Human Body: Circulation and Respiration is intended for use with your existing science curriculum. The courseware is directly correlated with Silver Burdett & Ginn science textbooks, but it is equally applicable to other science texts since it introduces and reinforces science concepts common to most science curricula.

Your students can gain a sense of personal accomplishment by completing the tutorials and activities included in ***The Human Body: Circulation and Respiration***. Each student can work independently at the computer, progressing at his or her own pace. On-screen instructions guide the student through each section of the program.

This Courseware Guide provides detailed information about introducing and using ***The Human Body: Circulation and Respiration***. To receive maximum benefit and enjoyment from the program, read the guide carefully.



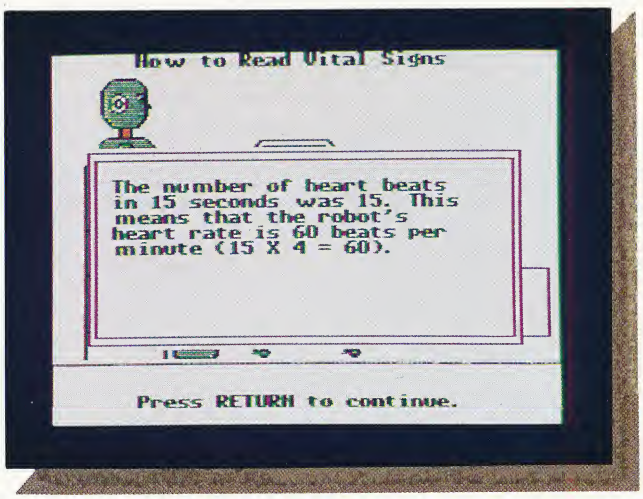
Food Chains and Food Webs | Investigating Plant Growth | The Human Body: Circulation and Respiration | Investigating Chemical Reactions | Climatrolls: A Weather Simulation

The Human Body: Circulation and Respiration is one of a series of SCIENCEWORKS courseware programs supporting Silver Burdett & Ginn science textbooks.

PROGRAM FEATURES

The Human Body: Circulation and Respiration is a courseware simulation program. By using a robot simulator in the Police Lab to analyze the vital signs of suspects apprehended near a crime scene, students determine the identity of the person who committed the crime. The program is designed to help students understand the circulatory and respiratory processes. It also reinforces critical scientific skills, including observation and interpretation of data. ***The Human Body: Circulation and Respiration*** has the following characteristics and special features.

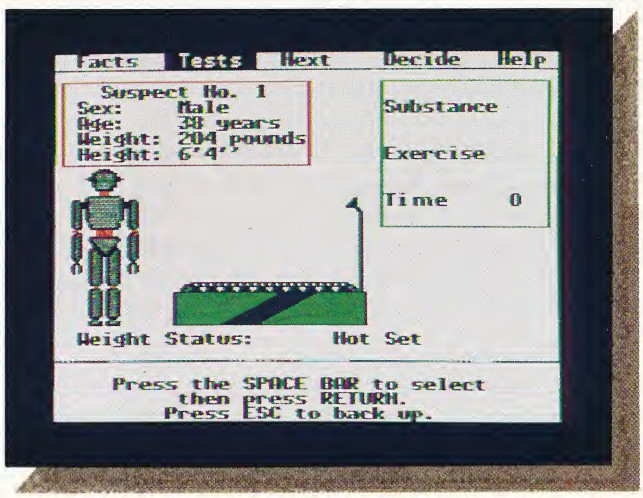
- Direct correlation with the science activities and skills presented in Silver Burdett & Ginn science textbooks and with those typically introduced in other science curricula
- Opportunity to use the scientific method in observing, classifying, and interpreting and analyzing data
- Use of the *Police Lab* independent of the simulation to test the effect of various substances on heart rate, breathing rate, and blood pressure according to age, sex, height, and weight
- Randomization of crimes and suspects so that students can use the program many times
- A careful balance of animation, graphics, and text
- Pacing that is controlled by the student
- Positive reinforcement and feedback in response to student performance
- Clear instructions that most students can follow independently
- Help screens that provide useful information and an instruction module that details how to conduct each test
- Fail-safe operation that disables other keyboard options when specific responses are required


How to Read Vital Signs
The number of heart beats in 15 seconds was 15. This means that the robot's heart rate is 60 beats per minute (15 X 4 = 60).
Press RETURN to continue.

How to read vital signs

There has been a crime in the area at Edinger's department store.
Press RETURN to move to the scene of the crime.
Press ESC to back up.

Crime report



The Police Lab

CORRELATION TABLE

The table below shows the correlation of ***The Human Body: Circulation and Respiration*** with specific chapters in Silver Burdett & Ginn science textbooks.

TEXTBOOKS		CHAPTERS
SILVER BURDETT & GINN SCIENCE © 1989, 1987	Grade 5	Chapter 14 — Transport Systems of the Body
	Grade 6	Chapter 14 — Control Systems of the Body
SILVER BURDETT & GINN SCIENCE © 1985, 1984	Grade 5	Chapter 14 — Transport Systems of the Body
	Grade 6	Chapter 14 — Control Systems of the Body
SILVER BURDETT & GINN GENERAL SCIENCE © 1989	Book One	Chapter 23 — Transport, Respiration, and Excretion
	Book Two	Chapter 22 — Control Systems
SILVER BURDETT & GINN LIFE SCIENCE © 1987		Chapter 19 — Transport, Respiration, and Excretion Chapter 20 — Control Systems

EQUIPMENT NEEDED

To use ***The Human Body: Circulation and Respiration*** you will need an Apple II Plus (64K including language card), Apple IIe, Apple IIc, or Apple IIGS computer; a color monitor, monochrome monitor, or TV; 1 disk drive. Note: If you are using an Apple IIGS with an RGB monitor, set the processor speed at normal and use a black border.

CARE OF COMPUTERS AND DISKS

You'll want to place your computers where the students using them will not be disturbed and where their use will not distract other students. Place computers away from direct sunlight, chalkboards, sinks, radiators, and heat ducts. To minimize carpet-induced static electricity, which can damage delicate electronic equipment, you can spray carpeting with a commercial antistatic product or a mixture of fabric softener and water. You might also purchase an antistatic mat. Advise your students to touch something metal before beginning to work at the computer. This will release any of the static charges they may be carrying.

It would be advisable to load the disk yourself when the students are first learning to use ***The Human Body: Circulation and Respiration***. Then let your students practice loading with a blank disk until you are sure that they can handle disks carefully. You may wish to open a defective disk to show curious students how disks are made.

COMPONENTS

The Disk

One double-sided program disk and one duplicate (backup) disk are included in the courseware package, ***The Human Body: Circulation and Respiration***. Each 5¼-inch floppy disk is intended for use with an Apple II Plus (64K including language card), Apple IIe, Apple IIc, or Apple IIGS computer. The program produces colorful graphics when displayed on a color monitor, and it also operates effectively on a monochrome monitor.

The Courseware Guide

Before you introduce ***The Human Body: Circulation and Respiration*** in your classroom, study the Courseware Guide thoroughly. The guide provides information about how the program works, how to integrate it into your science curriculum, and how to extend the concepts into other enjoyable science activities.

Copy masters are also included in the Courseware Guide. The copy masters are designed to complement the courseware. They may be reproduced directly or used to make spirit masters for duplication.

TEACHING STRATEGIES

The way in which you use ***The Human Body: Circulation and Respiration*** in your classroom depends upon your unique teaching style and the abilities of your students. You may wish to follow some of the teaching suggestions below.

- Use the program after you have taught about the circulatory and respiratory systems in order to reinforce the concepts.

  The tutorial section in the Police Lab reviews how to take blood pressure readings and how to calculate heart rate and breathing rate. This section can be used as a class demonstration. By using the Police Lab, students can better understand the relationship between the circulatory system and the respiratory system.

- Use the program to develop problem-solving skills related to science concepts.

  The Police Lab can be used by students to design experiments. Students can change the testing variables, observe results, record data, and draw conclusions. In the Police Lab simulation, students can use testing procedures that would not normally be available to them in real life. The testing process is made more relevant by giving students the opportunity to collect their own data and use this data in the Police Lab.

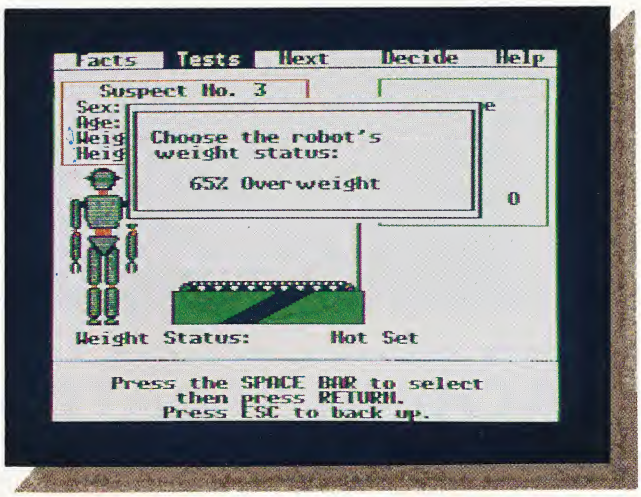
- Use the program when topics relating to drugs or alcohol are covered in the curriculum.

  The effect of substances such as caffeine, alcohol, nicotine, and carbon monoxide on the circulatory and respiratory systems can be tested in the Police Lab. Students can create and test "what if" situations. This can further their understanding of the impact that a substance, especially in combination with the factors of exercise and weight, has on the body.

PROGRAM OBJECTIVES

The SCIENCEWORKS series helps students review and extend basic science concepts presented in the Silver Burdett & Ginn science textbooks. Upon completion of all sections of ***The Human Body: Circulation and Respiration***, students should be able to do the following:

- Understand the relationship between the circulatory system and the respiratory system
- Analyze the impact of specific substances on the circulatory and respiratory systems
- Interpret and analyze test results to identify the guilty person from a list of suspects in the simulation
- Conclude that exercise increases the heart rate
- Describe differences in heart rate, blood pressure, and respiration rate based on such factors as age and weight
- Calculate heart rate and respiration rate using given data
- Describe the diastolic and systolic components of a blood pressure reading
- Collect data and record the results of tests on a chart



Testing a suspect

TIME ALLOTMENTS

The time necessary for students to use ***The Human Body: Circulation and Respiration*** program depends on how many assignments they take, whether they are familiar with the operation of the program, and whether they use the Police Lab independently.

Students should be able to complete the Introduction section and an assignment with the Heart and Lung Crime Force in about 15 minutes. If the Police Lab is used independently of the simulation, students should be able to enter a subject's statistics, set the conditions for a test, conduct a number of tests, and record the results in about 10–15 minutes. It takes about 5 minutes to go through the demonstration, "How to Read Vital Signs," in the Police Lab.

BACKGROUND INFORMATION

The Human Body: Circulation and Respiration is an extension of the Human Body block of Silver Burdett & Ginn Science textbooks. It can easily be adapted to other science curricula and levels as well. The following background information may be useful.

- The setting for this simulation is an undetermined time in the future, so a few technological liberties have been taken with the equipment used in the program. A ''portable body scanner'' is installed in each building of the city to detect the heart rate, breathing rate, and blood pressure of individuals as they leave the building. These vital signs are used to identify the guilty person in a crime that has been committed.

- A robot is used in the Police Lab. In the simulation the robot is set up with the same characteristics as a suspect selected from a lineup. Students set the weight status after consulting the appropriate table. The results of each test are based on the statistics for a person of that age, sex, height, and weight. The robot setup is displayed on the screen while students are using the Police Lab. If the Police Lab is accessed from the Main Menu, students will set the age, sex, height, and weight status for the robot and can either use the preset data for blood pressure, heart rate, and breathing rate or set these statistics from their own measurements. (The entry parameters for blood pressure are 45–180.)

- The statistics used for the effects of the substances on heart rate, breathing rate, and blood pressure were extensively researched. In such cases where individual statistics were not available, physician specialists were consulted as to the most probable effects. The data for blood pressure, heart rate, and breathing rate were compiled from a number of research studies and data obtained from the National Center for Health Statistics. The objective of the simulation is to convey the general effects of exercise, individual substances, and body weight on heart rate, blood pressure, and breathing rate.

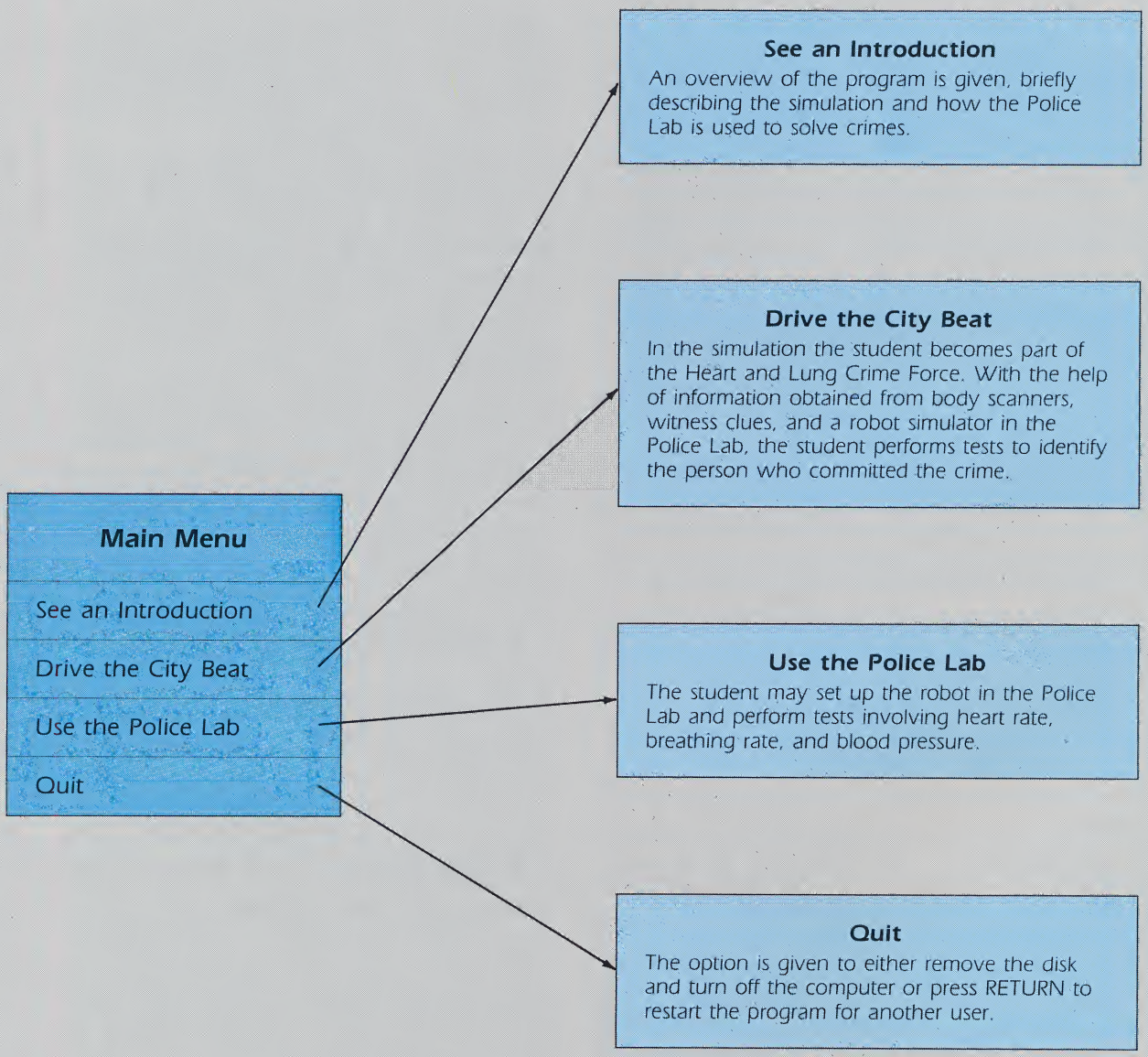
- The crime cases and suspects are generated randomly so that students can use the program many times. There are 20 crime cases and numerous suspects. The eyewitness accounts vary according to the crime.

- To make the generic Police Lab more relevant to students, any age from 4 to 59 years can be entered for the robot. The results of the tests are based on *age groups*, not individual statistics for each age level. The program uses the following age groups: 4–9, 10–13, 14–19, 20–29, 30–39, 40–49, 50–59. The parameters are for age, 4–59 years; for weight, 30–300 pounds; and for height, 3–6 feet 4 inches. All calculations are based on sex, age group, and the weight status as indicated in the program's Average Height/Weight Tables. The program uses the weight status (average weight or overweight by 25 percent, 45 percent, or 65 percent) entered by the student, *not* the actual height and weight of the suspect or subject. The program does not check whether the entered weight status is correct. Once the weight status is entered, the program bases all subsequent calculations on this entry. Therefore, it is important that students make sure the *correct weight status* is entered for the suspect or subject being tested in the Police Lab.

- **Although students can enter their own vital signs, make sure they are aware that the tests are being performed on a robot simulator and should not be reenacted in real life. The Police Lab is to be used for simulation purposes only.**

PROGRAM STRUCTURE

This diagram shows the general structure of the ***The Human Body: Circulation and Respiration*** program by indicating where each selection from the Main Menu leads.


Main Menu
See an Introduction
Drive the City Beat
Use the Police Lab
Quit
See an Introduction
An overview of the program is given, briefly describing the simulation and how the Police Lab is used to solve crimes.
Drive the City Beat
In the simulation the student becomes part of the Heart and Lung Crime Force. With the help of information obtained from body scanners, witness clues, and a robot simulator in the Police Lab, the student performs tests to identify the person who committed the crime.
Use the Police Lab
The student may set up the robot in the Police Lab and perform tests involving heart rate, breathing rate, and blood pressure.
Quit
The option is given to either remove the disk and turn off the computer or press RETURN to restart the program for another user.

PROGRAM DESCRIPTION

The Human Body: Circulation and Respiration contains three sections: Introduction, Drive the City Beat, and Use the Police Lab. Each section is described below.

Introduction

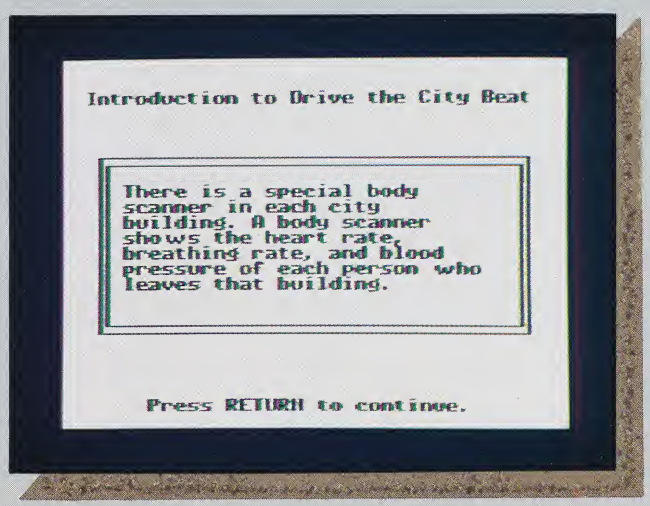
This section gives an overview of the simulation and provides a guide to the operation and content of the program. Students act as members of the Heart and Lung Crime Force, whose job is to solve crimes. After a crime is committed, students review the vital signs taken by the body scanner, interview eyewitnesses, save valuable clues, and use the robot simulator to test each of three suspects in the Police Lab. When the guilty person is identified, a Fitness Report summarizes students' performance and provides a rank and code for the next assignment. The Police Lab can be used independently to test a specific subject's blood pressure, heart rate, and breathing rate under a variety of conditions.

Drive the City Beat Menu

Drive the City Beat

Introduction to City Beat

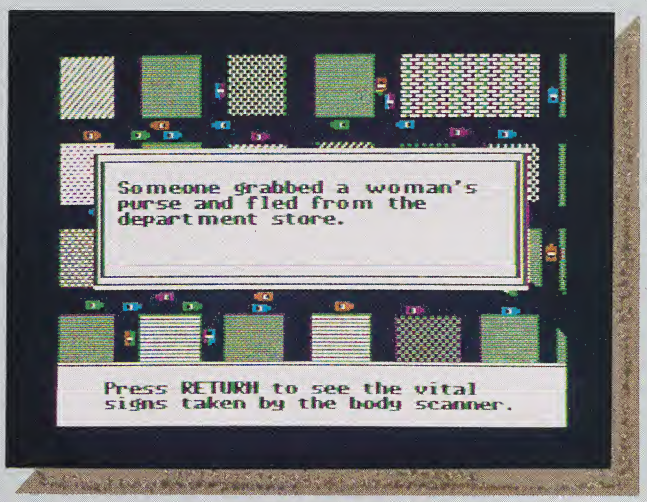
This section describes the scenario for the simulation. A police radio informs students of the crime location and the nature of the crime. The imaginary city has special body scanners in its buildings; the scanners display the blood pressure, heart rate, and breathing rate of everyone leaving the buildings. When a crime is committed, the vital signs of the guilty person are recorded on the body scanner. These vital signs are used in the Police Lab to identify the guilty person. Students interview witnesses to the crime and save important clues that indicate which tests to do in the Police Lab. In the Police Lab, a robot is configured with the same statistics as a suspect chosen from the lineup. Students set the conditions in the Police Lab to match the crime scene. The equipment in the Police Lab is used to take blood pressure readings and to determine heart rate and breathing rate. The suspect whose readings most closely match the readings taken at the crime scene is the guilty person. Instructions on how to read vital signs is available in the Police Lab.


Introduction to Drive the City Beat
There is a special body scanner in each city building. A body scanner shows the heart rate, breathing rate, and blood pressure of each person who leaves that building.
Press RETURN to continue.

Body scanner information

Drive the City Beat

When students enter this section, a radio message appears with the location and nature of the crime that has taken place. The body scanner shows the vital signs recorded for the guilty person leaving the building at the time of the crime. Eyewitness accounts are given about the guilty person. Students can save any clues that help in determining the appropriate tests to do in the Police Lab. For example, a clue that states "The suspect ran for 2 minutes before leaving the building." indicates that the robot should be tested with the exercise set to running (flat surface) and the timer set to 2 minutes. Students should look for clues that indicate type of substance, kind of exercise, and length of time. Not every crime situation will include all three types of information.


Someone grabbed a woman's purse and fled from the department store.
Press RETURN to see the vital signs taken by the body scanner.

Radio message reporting a crime

When all the clues are reviewed and the important ones saved, "Continue" should be selected. The next screen states that three suspects have been taken to Police Headquarters for questioning. After RETURN is pressed, a lineup of three suspects appears. The outlines on the lineup do not change, but the different suspects they represent are detailed in the Police Lab. When a suspect has been chosen for testing in the Police Lab, the sex, age, weight, and height of that suspect are listed in the upper left corner of the Police Lab screen. All three suspects will be the same age and sex, but their heights and weights will differ.

I saw the guilty person being chased by the store manager for about 5 minutes before the guilty person left the building.
Next Witness
SAVE CLUE
Continue
Press the SPACE BAR to select, then press RETURN.

Witness clue

Once the suspect chosen from the lineup is placed in the Police Lab, students should review the vital signs taken by the body scanner and the saved clues, which are located on the menu under "Facts." The weight status must be set before any tests are conducted. When "See Weight Tables" is chosen on the menu under "Tests," the height and weight table for the sex of the suspect will appear. The suspect's height and weight should be located on the table to determine if he or she is of average weight or overweight by 25 percent, 45 percent, or 65 percent. The weight status is important in testing the suspect because certain vital signs are especially affected by excess weight. When the weight status is determined, it is set by choosing "Set Weight Status" under "Tests."

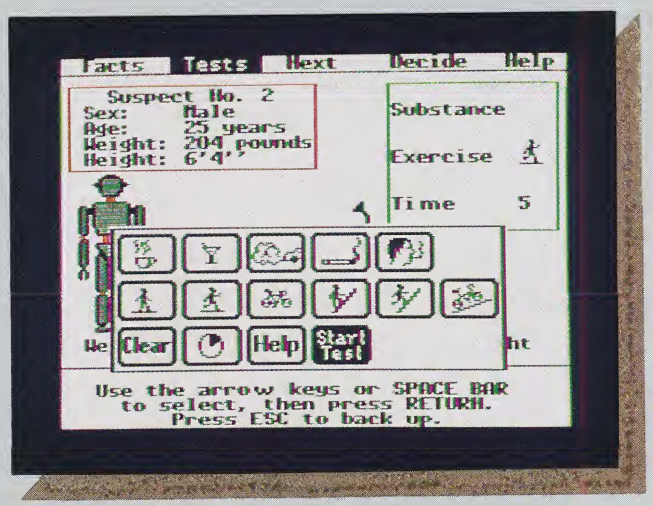
Suspect lineup

A ''Help'' option on the top menu provides the order of activities to be done in the Police Lab, in case students are unsure of the correct procedure. A student unfamiliar with the tests in the Police Lab should choose ''How to Read Vital Signs'' under ''Tests'' to learn how to take blood pressure readings and to calculate heart rate and breathing rate.

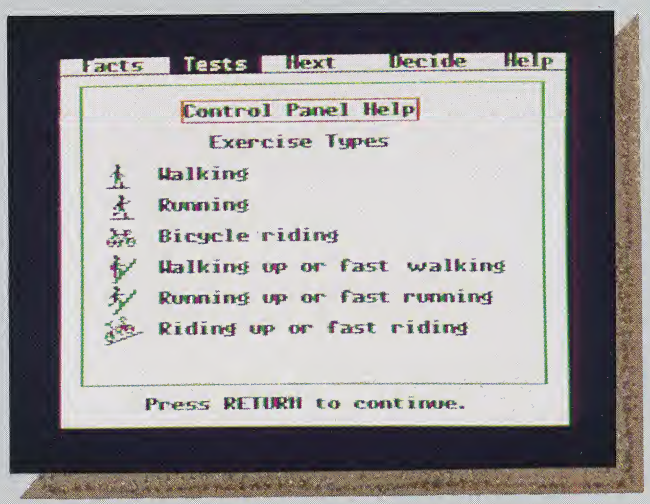
After the weight status is set and students have reviewed the clues and the vital signs, the test can be set up for the robot by selecting ''Use the Control Panel'' on the menu under ''Tests.''

The Control Panel lists five substances—coffee, alcohol, car exhaust, cigarette smoke (nonsmoker), and cigarette smoke (smoker)—and six exercise types—walking, running, bicycle riding, fast walking, fast running, and fast bicycle riding. The substances and exercises are represented by icons that are explained on the Help screens accessed from the Control Panel. As selections are made on the Control Panel, they are shown in the upper right section of the Police Lab screen. Only one substance and one exercise can be selected for a single test. The timer is set to the number of minutes for which the test is to be conducted. There is a ''Clear'' option to set the substance and exercise to none and the timer to zero. Once the conditions are set for testing the robot, ''Start Test'' is chosen by pressing RETURN. If ''Start Test'' is selected without an exercise or the timer is not set, the results for the blood pressure, heart rate, and breathing rate will reflect vital signs at rest.

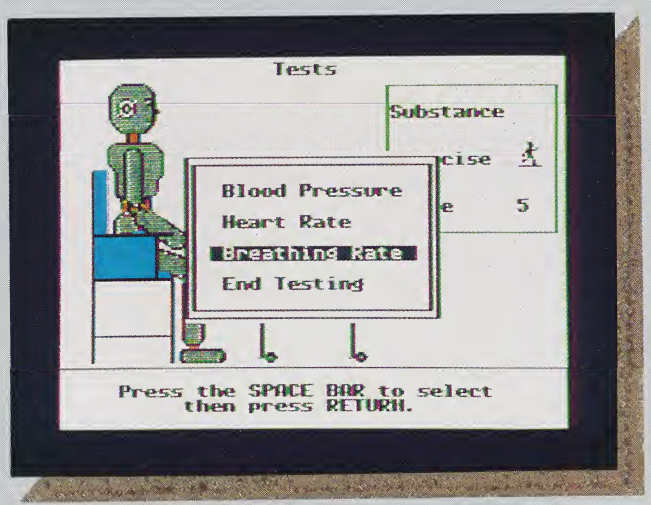
After the robot has completed the exercise, readings for the blood pressure, heart rate, and breathing rate can be taken. Students should record the data and determine if the vital signs closely match those for the guilty person. The results of each test can be recorded on a copy of the Police Lab Record Sheet A (copy master on page 26). If the vital signs match, ''Decide'' is chosen to identify which suspect is guilty. If the vital signs do not match, ''Next'' is chosen to test another suspect from the lineup. The suspect(s) already tested in the Police Lab will be indicated by a box around the number on the lineup screen. A suspect



In the Police Lab



Control Panel Help—Exercise Types

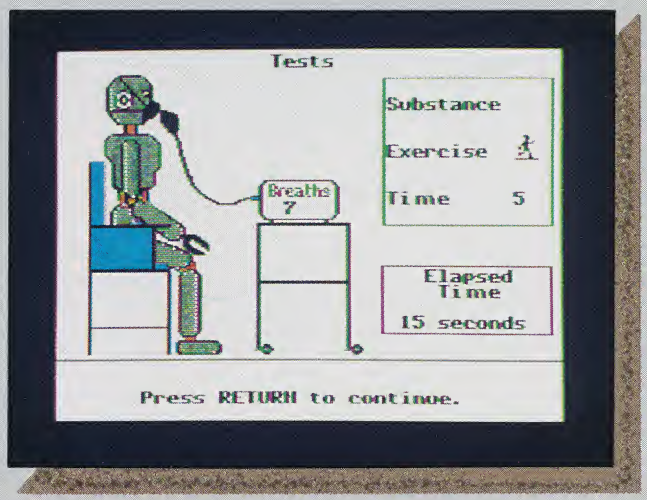


Menu for testing vital signs

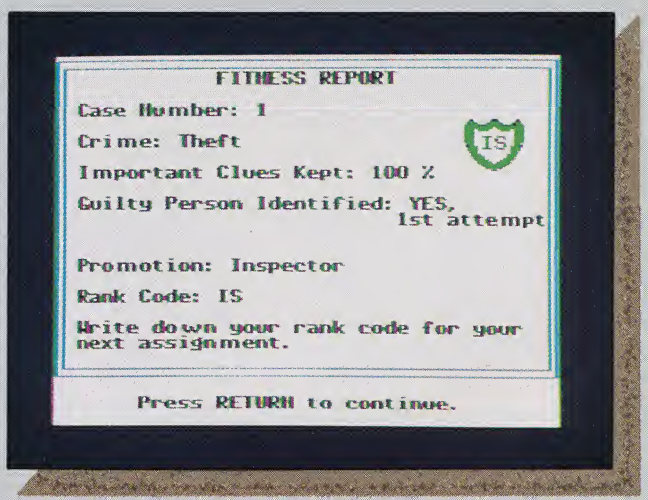
may be tested as many times as needed. If none of the suspects closely match the data for the guilty person, students should review the clues and evaluate the conditions set up for testing the robot.

When the guilty person is identified, the Fitness Report appears. This report indicates the case number, crime type, percentage of important clues saved, whether the guilty person was identified by the student, promotion (if any), and rank code. Promotions (double, single, or none) are based on whether correct identification of the guilty person is made on the first or second attempt, how many of the important witness clues are saved, and how many of the unimportant witness clues are discarded. (A student might save *all* the witness clues when only two were important. The Fitness Report would indicate that 100% of the important clues were kept. However, since unimportant witness clues also were saved, this would have an effect on the promotion status.)

The possible ranks and their codes are Cadet (beginning rank—no code), Officer (PO), Inspector (IS), Lieutenant (LT), and Captain (CT). Students should record their rank code before leaving the Fitness Report screen. Then, if they turn off the computer and use the program at another time, their rank code can be entered on the appropriate screen.



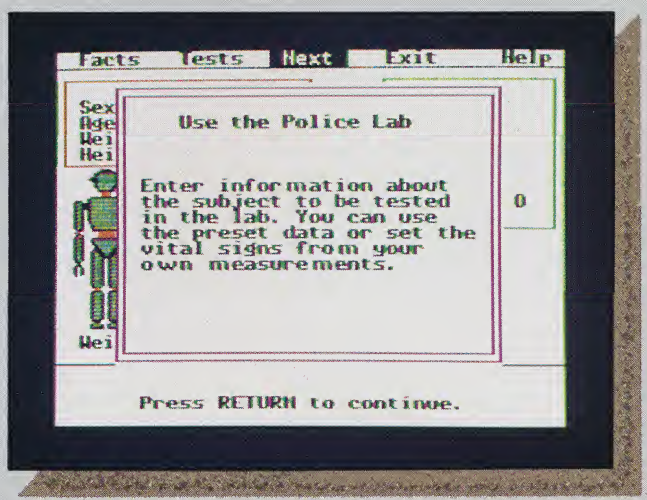
Breathing rate test



Fitness Report

Use the Police Lab

When this section is chosen from the Main Menu, the Police Lab is used independently of the simulation. Students enter the sex, age, weight, and height of the subject they want tested by the robot simulator in the Police Lab and set the weight status. In the Police Lab, students can use the preset data for the age group of the subject or enter their own measurements for blood pressure, heart rate, and breathing rate. These measurements, if entered by students, should be taken "at rest."

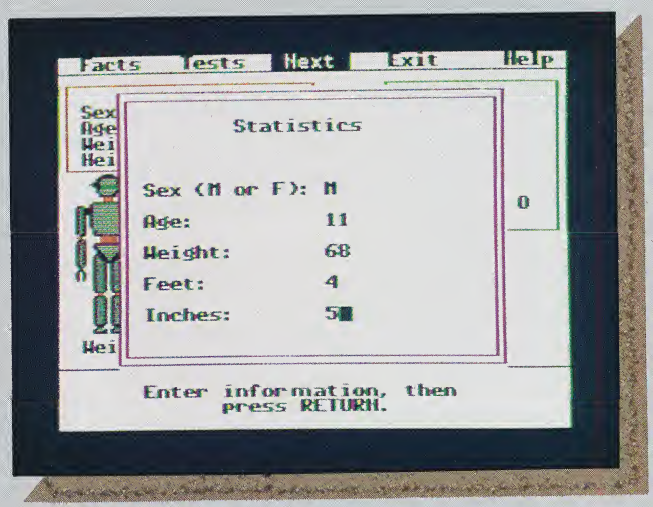

Facts
Tests
Next
Exit
Help
Use the Police Lab
Enter information about the subject to be tested in the lab. You can use the preset data or set the vital signs from your own measurements.
0
Press RETURN to continue.

Using the Police Lab independently

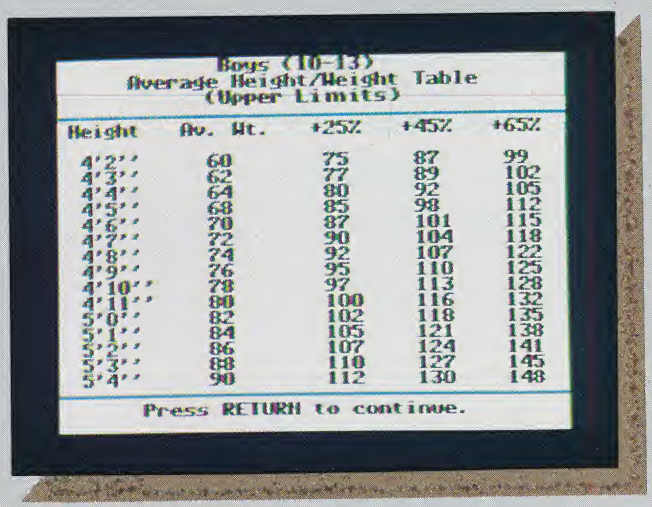
The menu selections in this section are similar to those of the Police Lab in "Drive the City Beat." The Police Lab has five menu options conveniently located at the top of the screen.

The "Facts" option offers two choices. Students can select "Vital Signs" or "Set Vital Signs." The first choice displays the preset vital signs for the age group of the subject or displays the last measurements that students entered. The calculations for the effects of a substance and of exercise are based on these vital signs. The second choice, "Set Vital Signs," allows students to enter their own measurements for systolic and diastolic pressure (entry parameters are 45–180), heart rate, and breathing rate. If RETURN is pressed with no entry made, the previously set data will be substituted. This is done so that a combination of preset data and student measurements can be used. For example, blood pressure readings may be more difficult for students to obtain, so they could enter their own heart rate and breathing rate measurements but use the presest measurements for systolic and diastolic pressure. Since all calculations are based on the weight status for a particular age group and sex, it is important that students enter the *correct* weight status for the results to be valid.

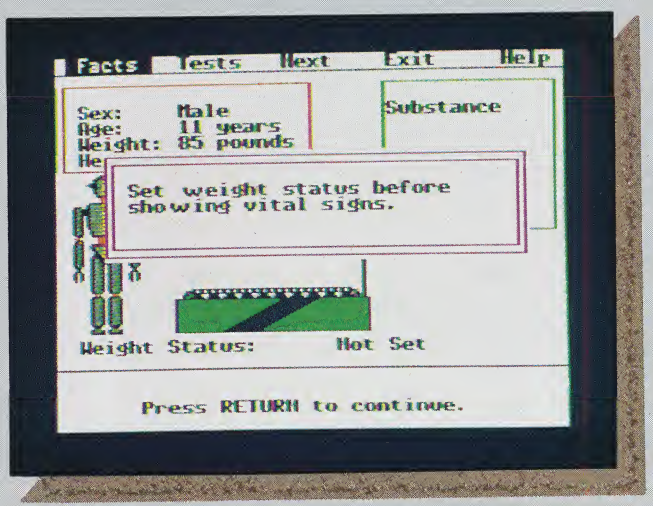
The "Tests" option offers four choices. Upon entering the Police Lab, students should select "See Weight Tables" to determine the weight status of the subject. When the table for the subject's sex and age group appears, students should locate on the table the height and then the weight status closest to the weight of the subject (average weight or overweight by 25 percent, 45 percent, or 65 percent). After the weight status is determined, it is set by selecting "Set Weight Status." This information is displayed on the Police Lab screen throughout the testing process. The weight status must be set before the vital signs can be viewed or set and before any tests are conducted.



Statistics screen

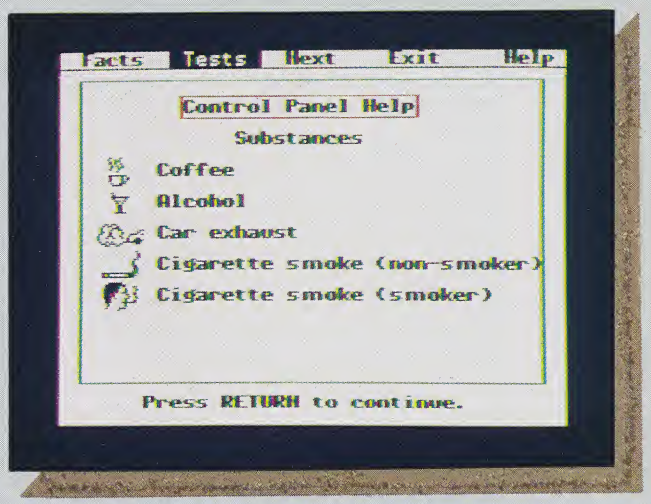


Average Height/Weight Table



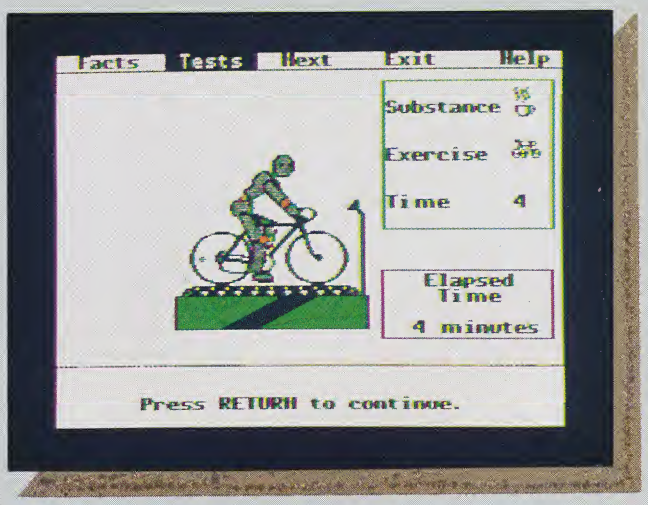
Reminder to set the weight status

The third ''Tests'' option, ''Use the Control Panel,'' is the selection used most often in the Police Lab. Students use the Control Panel to set the conditions for a robot test. There are five substance options and six exercise types offered in the Police Lab. They are represented by icons and are located in sections on the Control Panel. Only one substance and one exercise can be set for a single test, although both do not have to be used for every test. When a substance or exercise is chosen, it is shown in the upper right section on the Police Lab screen so that students can see under what conditions the robot is being tested. The last line on the Control Panel includes ''Clear,'' which erases all conditions previously set; a clock timer to set the length of an exercise; ''Help,'' which shows how to use the Control Panel and the meaning of the icons; and ''Start Test,'' which begins the robot test based on the conditions set.



Control Panel Help—Substances

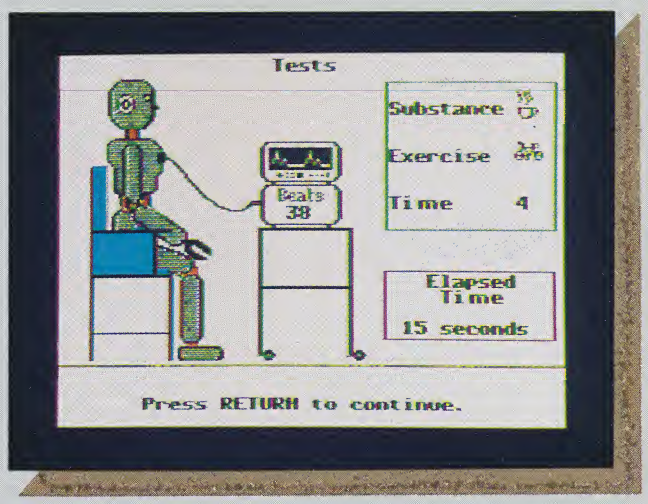
The fourth ''Tests'' option is ''How to Read Vital Signs.'' This tutorial section provides information on how blood pressure is measured and how to compute heart rate and breathing rate. Each test is demonstrated.



Starting a test

The ''Next'' option allows students to enter the statistics for another subject to be tested in the Police Lab. The ''Exit'' option enables students to leave the Police Lab and return to the Main Menu. The last option, ''Help,'' reviews the order in which procedures should be done in the Police Lab.

The Police Lab can be used in an open-ended way by students to design their own experiments and to develop science skills in testing hypotheses, recording data, and drawing conclusions. With five substances and six exercises, the testing options are numerous. Students can record the results of each test on a copy of Police Lab Record Sheet B (copy master on page 29).



Heart rate test

TRIAL SIMULATION

The crime simulation in ***The Human Body: Circulation and Respiration*** gives students an opportunity to use their problem-solving skills in the Police Lab to identify the guilty person. For students to receive maximum benefit and enjoyment from the program, you may want to give them a complete demonstration of the simulation by following the instructions below. This will take about 25 minutes. A copy of Police Lab Record Sheet A (copy master on page 26) can be used to record important information and test results.

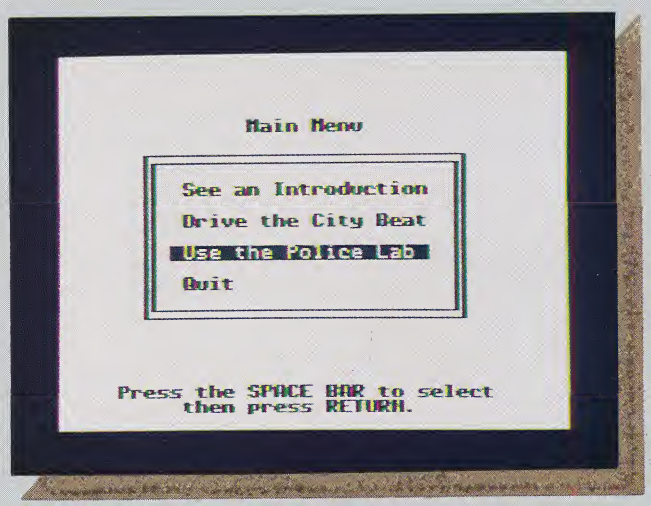
(1) Turn on the monitor, insert the disk, and turn on the computer. A few introductory screens will appear. When prompted, turn the disk over, insert it in the disk drive, and press RETURN. The title screen will appear and automatically advance after about 5 seconds. Press RETURN to advance faster.

(2) Enter your name and press RETURN. Point out to students that if they had a rank from a previous assignment, the two-letter code would be entered on this screen. For this demonstration, there is no previous rank code; press N for no. Use the SPACE BAR to select "Turn Sound On" and press RETURN.

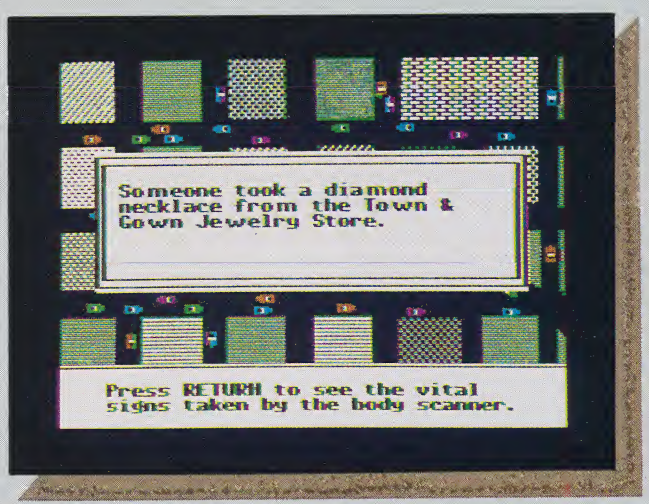
(3) The Main Menu appears. Show students how to select an option by pressing the SPACE BAR. Note that the box highlights each choice in order as the SPACE BAR is pressed. Continue to press the SPACE BAR until the box highlights "See an Introduction" and press RETURN. This procedure is used to make selections throughout the program.

(4) "See an Introduction" gives an overview of the simulation and explains how the Police Lab is used to solve crimes and how it can be used by itself. Read the introduction screens aloud and press RETURN after each one. When the Main Menu reappears, select "Drive the City Beat" and press RETURN.

(5) A submenu appears for this section. Choose "Introduction to City Beat" for a brief explanation of the steps to follow in solving the crime. Read these screens aloud and review the order with students. Upon returning to the submenu, select "Drive the City Beat" and press RETURN. A



Main Menu


Someone took a diamond
necklace from the Town &
Gown Jewelry Store.
Press RETURN to see the vital
signs taken by the body scanner.

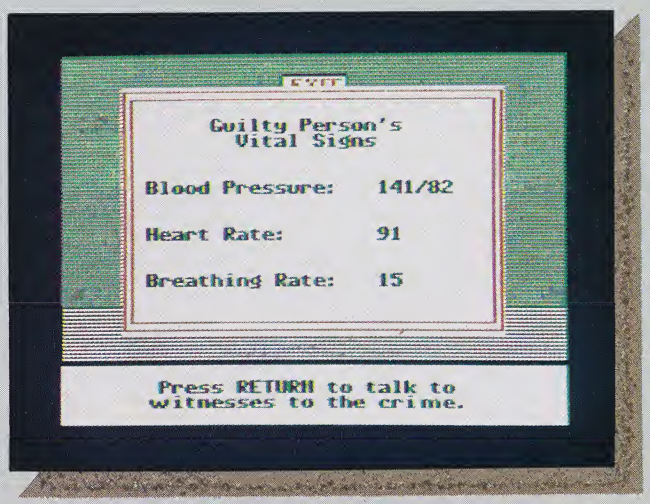
Driving the City Beat

view of the city will appear with the radio message detailing where the crime has taken place. When RETURN is pressed to move to the scene of the crime, information about the crime is transmitted through the police radio. The next screen shows the body scanner and vital signs scanned for the guilty person leaving the building at the time of the crime. Emphasize to students that these are the vital signs they will try to match in the Police Lab.

(6) Next, witness interviews are taken and important clues are saved. Press RETURN to read the witness remarks. When the clues to save have been determined, use the SPACE BAR to move the highlight box to "Save Clue" for each witness account you want to save for reference in the Police Lab. The clues saved will help to set the conditions in the Police Lab to match those of the crime scene. Discuss with students the type of clue that is important to save. Clues that indicate a type of exercise (walking, running up stairs) or a substance (alcoholic drink) should be saved. Clues that indicate something that happened at another time should not be saved. When all the appropriate clues are saved, use the SPACE BAR to highlight "Continue" and press RETURN.

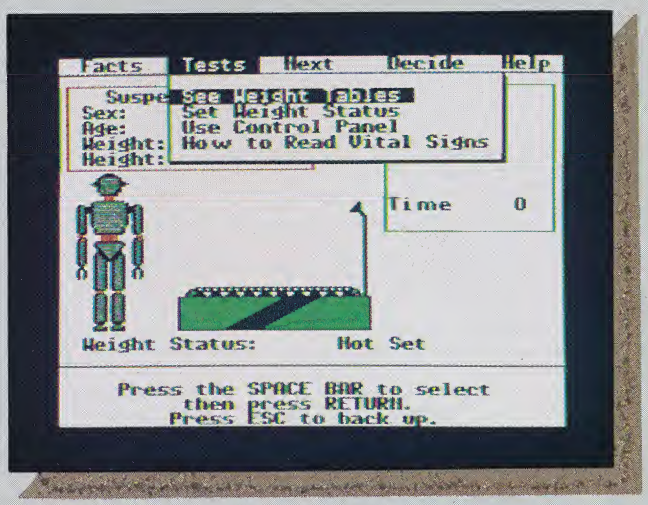
(7) The next screen informs you that three people have been taken to Police Headquarters for questioning, and the following screen shows the lineup of suspects. The shapes in the lineup are the same each time, but the individual statistics for each suspect can be seen in the Police Lab. Choose a suspect to place in the Police Lab and press RETURN.

(8) In the Police Lab the selected suspect's sex, age, weight, and height are displayed in a box in the upper left corner of the screen. The menu choices are all listed at the top of the screen. Use the SPACE BAR to show students how to make selections from this menu. When the highlight box is on "Facts," press RETURN to show how a submenu appears under the main choice. Select "Vital Signs" to view the vital signs taken by the body scanner and then select "Clues" to review the clues saved.



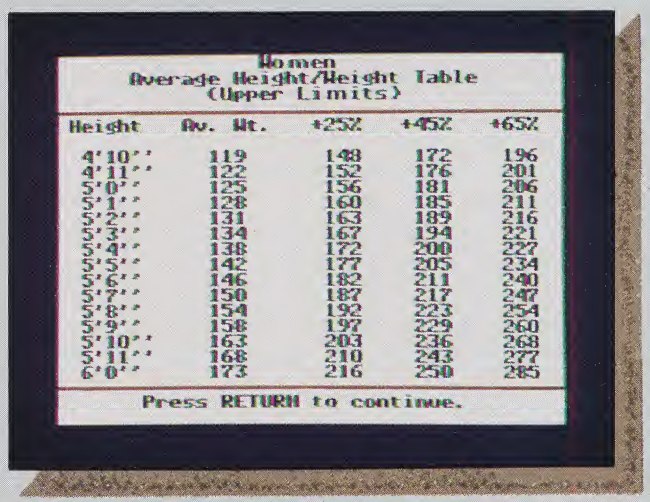
Guilty person's vital signs

Saving a witness clue



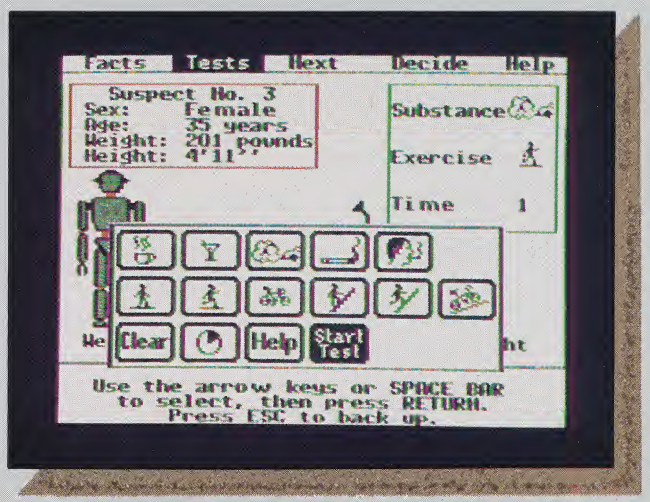
In the Police Lab

(9) Next move the highlight box to ''Tests'' and press RETURN to see the submenu choices. Once a submenu is displayed, ESC can be pressed to back up if no choice is desired. Choose ''See Weight Tables'' to determine the weight status of the suspect you are testing. The table for men or women will appear, depending on the sex of the suspect. Find the height of the suspect and then locate the weight status across from that height. Press RETURN to continue and then select ''Set Weight Status'' from the ''Tests'' menu. Use the SPACE BAR to set the weight status for the suspect and then press RETURN. The weight status will be displayed under the robot throughout the testing in the Police Lab.



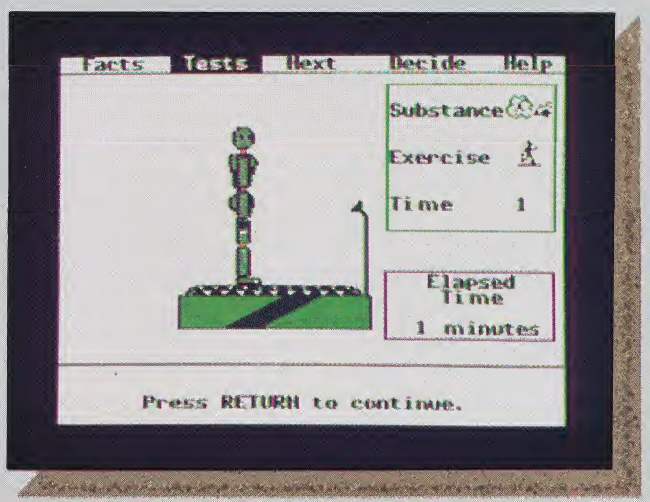
Height/Weight Table

(10) Before setting the conditions for the test, select ''How to Read Vital Signs'' under the ''Tests'' menu. This is a short demonstration of how to take blood pressure readings and how to compute heart rate and breathing rate. Go through all the selections in this section and ask students if they have any questions about how the tests are conducted. Then choose ''Return to Lab.''



Control Panel

(11) To begin testing, select ''Use Control Panel'' under the ''Tests'' menu. The Control Panel appears with the highlight box on the coffee icon. Explain to students that each substance and exercise is represented by an icon, or picture. Use the SPACE BAR or the arrow keys to move the highlight box to ''Help'' on the third line and press RETURN. These screens explain the meanings of each icon and key on the panel. With the coffee icon highlighted, press RETURN and note that the same coffee icon appears in the box in the upper right corner of the screen, next to ''Substance.'' This box represents the present conditions for testing the robot. If another substance choice is made, it will replace the previous one. The same process is used to choose an exercise. To clear all the choices, select ''Clear'' on the third line of the Control Panel. Using the saved clues as a guide, set the conditions for testing the first suspect. Set the substance, exercise, and timer (clock icon). Then select ''Start Test.''

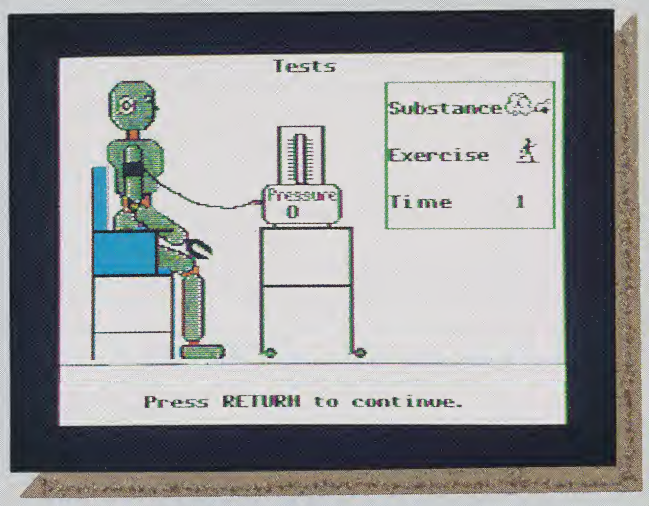


Testing Begins

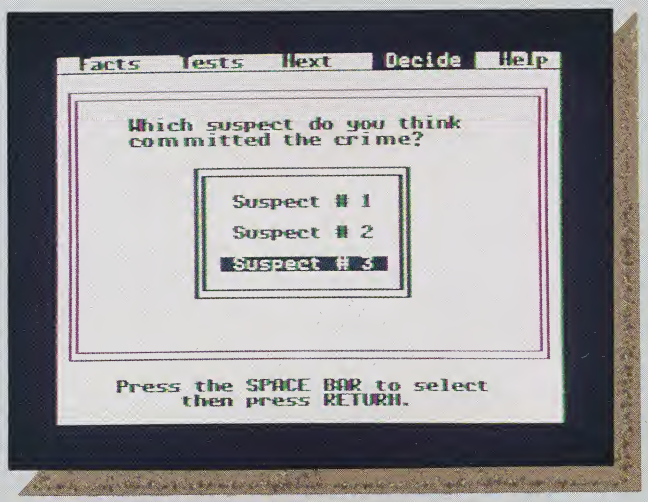
(12) The robot will appear on the treadmill and do the exercise for the time set. If no exercise was chosen, the robot will be shown ready for the vital signs tests. When the exercise is completed, press RETURN and choose "Blood Pressure" from the testing menu. Record the systolic and diastolic pressure. Select "Heart Rate" and then "Breathing Rate" from the testing menu to complete the tests for vital signs. Remember to multiply each number by 4 to get the rate for 1 minute. After recording the data for blood pressure, heart rate, and breathing rate, select "End Testing." Check the vital signs of the guilty person by selecting "Vital Signs" from the "Facts" menu to see if the data from testing the suspect match. Slight differences between the data of the guilty person and the data of the suspects may exist because the program uses whole numbers and rounds to the nearest number that can be evenly divided by 4. (A number that is in the "middle" rounds up. For example, 10 would round up to 12.) When calculating heart rate and breathing rate, the numbers given are to be multiplied by 4, but the rates shown for the guilty person are not always even multiples of 4.

(13) If the vital signs of the suspect closely match the vital signs taken by the body scanner, choose "Decide" to identify the person guilty of the crime. If there is no match, choose "Next" to test another suspect in the lab. Note that the number of the suspect already tested is outlined with a box. When another suspect is chosen from the lineup, set the weight status and choose "Use the Control Panel" to start another test. The testing conditions are already set from the previous suspect. Continue this process until the guilty person can be identified. If none of the test results match, review the clues to make sure the conditions set for the tests are the same as those at the scene of the crime.

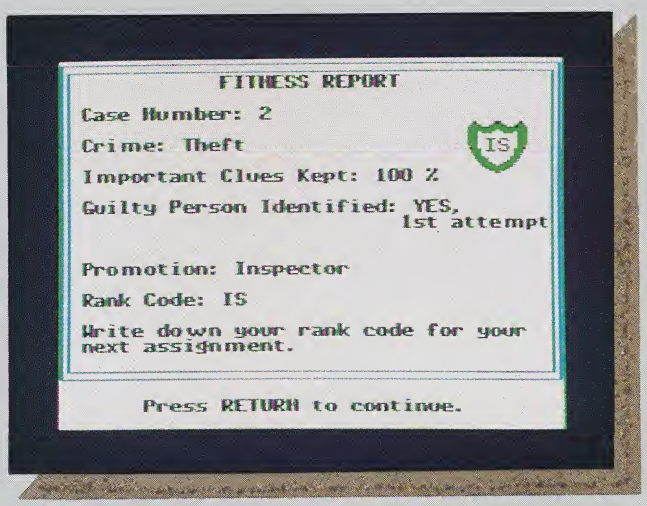
(14) Once the guilty person is identified, the Fitness Report appears. It details the crime number, the type of crime, the percentage of important clues kept, whether the suspect was identified correctly, and the promotion and rank code for the next assignment. If no promotion is granted and the student is on the Cadet level, there will be no rank code listed. Emphasize the importance of recording the rank code so that it can be used for the next assignment. Press RETURN to go to the Main Menu and choose "Quit" to end the demonstration.



Blood pressure test



Making a decision



Fitness report

AVERAGE HEIGHT/WEIGHT TABLES FOR AGES 4–13

The average height/weight tables used to set the weight status for ages 4–13 in ***The Human Body: Circulation and Respiration*** are given below.

Girls (4–9)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
3′1″	30	37	43	49
3′2″	34	42	49	56
3′3″	38	47	55	62
3′4″	42	52	60	69
3′5″	46	57	66	75
3′6″	50	62	72	82
3′7″	54	67	78	89
3′8″	56	70	81	92
3′9″	58	72	84	95
3′10″	60	75	87	99
3′11″	62	77	89	102
4′0″	64	80	92	105
4′1″	68	85	98	112
4′2″	72	90	104	118
4′3″	76	95	110	125

Boys (4–9)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
3′2″	30	37	43	49
3′3″	34	42	49	56
3′4″	38	47	55	62
3′5″	42	52	60	69
3′6″	46	57	66	75
3′7″	50	62	72	82
3′8″	54	67	78	89
3′9″	56	70	81	92
3′10″	58	72	84	95
3′11″	60	75	87	99
4′0″	62	77	89	102
4′1″	64	80	92	105
4′2″	68	85	98	112
4′3″	72	90	104	118
4′4″	76	95	110	125

Girls (10–13)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
4′2″	60	75	87	99
4′3″	62	77	89	102
4′4″	64	80	92	105
4′5″	68	85	98	112
4′6″	70	87	101	115
4′7″	72	90	104	118
4′8″	74	92	107	122
4′9″	76	95	110	125
4′10″	78	97	113	128
4′11″	80	100	116	132
5′0″	82	102	118	135
5′1″	84	105	121	138
5′2″	86	107	124	141
5′3″	88	110	127	145
5′4″	90	112	130	148

Boys (10–13)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
4′2″	60	75	87	99
4′3″	62	77	89	102
4′4″	64	80	92	105
4′5″	68	85	98	112
4′6″	70	87	101	115
4′7″	72	90	104	118
4′8″	74	92	107	122
4′9″	76	95	110	125
4′10″	78	97	113	128
4′11″	80	100	116	132
5′0″	82	102	118	135
5′1″	84	105	121	138
5′2″	86	107	124	141
5′3″	88	110	127	145
5′4″	90	112	130	148

AVERAGE HEIGHT/WEIGHT TABLES FOR AGES 14–ADULT

The average height/weight tables used to set the weight status for ages 14–adult in ***The Human Body: Circulation and Respiration*** are given below.

Girls (14–19)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
4′10″	85	106	123	140
4′11″	93	116	134	153
5′0″	101	126	146	166
5′1″	109	136	158	179
5′2″	117	146	169	193
5′3″	122	152	176	201
5′4″	126	157	182	207
5′5″	130	162	188	214
5′6″	134	167	194	221
5′7″	138	172	200	227
5′8″	142	177	205	234
5′9″	146	182	211	240
5′10″	150	187	217	247
5′11″	152	190	220	250
6′0″	154	192	223	254

Boys (14–19)
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
4′10″	85	106	123	140
4′11″	93	116	134	153
5′0″	101	126	146	166
5′1″	109	136	158	179
5′2″	117	146	169	193
5′3″	125	156	181	206
5′4″	141	176	204	232
5′5″	144	180	208	237
5′6″	149	186	216	245
5′7″	157	196	227	259
5′8″	165	206	239	272
5′9″	173	216	250	285
5′10″	181	226	262	298
5′11″	189	236	274	311
6′0″	197	246	285	325

Women
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
4′10″	119	148	172	196
4′11″	122	152	176	201
5′0″	125	156	181	206
5′1″	128	160	185	211
5′2″	131	163	189	216
5′3″	134	167	194	221
5′4″	138	172	200	227
5′5″	142	177	205	234
5′6″	146	182	211	240
5′7″	150	187	217	247
5′8″	154	192	223	254
5′9″	158	197	229	260
5′10″	163	203	236	268
5′11″	168	210	243	277
6′0″	173	216	250	285

Men
Average Height/Weight Table
(Upper Limits)

Height	Av. Wt.	+25%	+45%	+65%
5′2″	141	176	204	232
5′3″	144	180	208	237
5′4″	148	185	214	244
5′5″	152	190	220	250
5′6″	156	195	226	257
5′7″	161	201	233	265
5′8″	166	207	240	273
5′9″	170	212	246	280
5′10″	174	217	252	287
5′11″	179	223	259	295
6′0″	184	230	266	303
6′1″	189	236	274	311
6′2″	194	242	281	320
6′3″	199	248	288	328
6′4″	204	255	295	336

EXTENDING ACTIVITIES

The following activities may be used to extend student understanding of the concepts and processes found in ***The Human Body: Circulation and Respiration***.

- Have the school nurse demonstrate how to take blood pressure using a sphygmomanometer (instrument for measuring blood pressure). Discuss the systolic and diastolic components that comprise a blood pressure reading. Have students investigate the normal range of blood pressure for their age group and the possible causes of lower or higher rates. Discuss why high blood pressure is dangerous.

- Demonstrate how to measure pulse rate by placing two fingers on the inside of the wrist near the base of the thumb. Have students practice taking their own pulse. Divide the group of students into pairs, naming one student the subject and the other the investigator. Make sure each pair has a watch or clock with a second hand. Have the investigator take the subject's pulse at rest by counting the number of pulse beats in 15 seconds and then multiplying by 4 to find the pulse rate for 1 minute. Record this number as the pulse at rest. Next have the subject jog in place for 2 minutes and then sit down. Have the investigator take the subject's pulse again and record the number as the pulse after exercise. With the subject at rest, have the investigator take the pulse again after 2 and 4 minutes. Record each of these results. Have each student create a bar graph showing the results of the activity. Discuss the effect of exercise on pulse rate.

- Have a representative from the American Red Cross or local medical center demonstrate CPR (cardiopulmonary resuscitation) and discuss its importance in treating heart attack victims.

- Have students write to the local chapter of the American Lung Association and ask for information on the respiratory system.

- A human heart beats an average of 72 times per minute. Have students calculate the number of beats in a year: $72 \times 60 \times 24 \times 365$. An overweight person's heart might have to beat an extra 10 times per minute. Have students calculate how many extra beats that would be in a year; $(82 \times 60 \times 24 \times 365) - (72 \times 60 \times 24 \times 365)$.

- Ask students to make a list of ten food items that they eat regularly. Have them look up the fat content of each of the items. Discuss the findings of the group and make one list arranged from low to high fat content.

- Have groups of students research the types of artificial hearts and some well-known recipients. Have students include the advantages and disadvantages associated with the use of artificial hearts.

- Have students use the data obtained from the generic Police Lab to make a line graph showing the effects of a substance on heart rate. Have them do the same for blood pressure and breathing rate.

- Invite a specialist in sports medicine to speak to the physical education class about the benefits of exercise to the circulatory and respiratory systems. Have the specialist demonstrate the proper way to do exercise to avoid injury and obtain maximum benefits.

- Suggest that students organize and produce an exercise videotape for their school. Have them include demonstrations of the proper way to do each exercise and to monitor heart rate.

RESOURCE MATERIALS

Computer Courseware

SILVER BURDETT & GINN SCIENCE Vocabulary Disk for Grade 5, Chapter 14, "Transport Systems of the Body." For use with ***Spellagraph***™, ***Spellakazam***™, or ***Planet of Lleps***™.

SILVER BURDETT & GINN SCIENCE Vocabulary Disk for Grade 6, Chapter 14, "Control Systems of the Body." For use with ***Spellagraph***™, ***Spellakazam***™, or ***Planet of Lleps***™.

Sound Filmstrips

Transport Systems of the Body. Morristown, N.J.: Silver Burdett & Ginn, 1987. 100 frames, color; cassette.

Control Systems of the Body. Morristown, N.J.: Silver Burdett & Ginn, 1987. 100 frames, color; cassette.

Books for Students

Berger, Melvin. *Sports Medicine*. New York: Thomas Y. Crowell Co., Publishers, 1982. ISBN 0-690-04210-8

Howe, James. *The Hospital Book*. New York: Crown Publishers, Inc., 1981. ISBN 0-517-54235-8

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COPY MASTERS

The following pages (26–32) contain copy masters to be used with ***The Human Body Circulation and Respiration***. The descriptions of the copy masters listed below include suggestions for their use.

Police Lab Record Sheet A

This copy master provides a record sheet that students can use while working on one of the program's crime simulations. They can enter the information given, indicate which tests they perform on the robot in the Police Lab, and record the results of those tests for each suspect. If the vital signs of one of the suspects do not match or nearly match the vital signs of the guilty person, students will need to review their records. Perhaps they have not kept the important witness clue or clues that would help them in deciding which test or tests to perform on the robot; or perhaps an exercise test has not been done for the correct amount of time. The use of this record sheet will give students practice in gathering and analyzing data, applying problem-solving strategies, and keeping orderly records.

Police Lab Fitness Report Forms

This copy master contains forms that resemble the program's Fitness Report that appears on the screen at the completion of a Police Lab crime simulation. Each crime has a specific case number that appears on the Fitness Report. Students can use copies of these forms to keep a record of the crime cases they have worked on, their performance results, and their rank codes.

Police Lab Record Sheet B

A copy of this record sheet can be given to students when they are using the Police Lab independently. At the top of the sheet, students can enter the statistics for the subject being tested and the subject's vital signs at rest. Space is provided for the results of robot tests performed in the Police Lab. Students can use the robot to test various combinations of statistics, substances, exercise types, and exercise times, and they can record the resulting blood pressures, heart rates, and breathing rates on this sheet.

Loading Disks/Keyboard Guide

A copy of this information may be posted near the computer to provide students with instructions for loading disks and easy reference to special keys used in the program.

Care of Disks

This copy master graphically presents guidelines for disk care and handling. You may want to post a copy near the computer and give a copy to each of your students.

Quick Start

This copy master provides abbreviated and graphic loading instructions for the Apple computer. These directions may be reproduced and posted near the computer as a ready reference for students.

NAME _____

Police Lab Record Sheet A

Crime Description	Witness Clues Saved
Guilty Person's Vital Signs	
Blood Pressure	
Heart Rate	
Breathing Rate	

	Statistics and Tests	Suspect # 1	Suspect # 2	Suspect # 3
Statistics	Sex			
	Age			
	Weight			
	Height			
	Weight Status			
Substance Tests	Coffee			
	Alcohol			
	Car exhaust			
	Cigarette smoke (nonsmoker)			
	Cigarette smoke (smoker)			
Exercise Tests	Walking			
	Running			
	Bicycle riding			
	Walking up or fast walking			
	Running up or fast running			
	Riding up or fast riding			
	Exercise Time			
Suspect's Vital Signs (Robot Test Results)				
	Blood Pressure			
	Heart Rate			
	Breathing Rate			

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NAME _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

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NAME _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

POLICE LAB FITNESS REPORT

Case Number _____

Crime _____

Important Clues Kept _____ %

Guilty Person Identified _____

1st attempt _____

2nd attempt _____

Promotion _____

Rank Code _____

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NAME _____

Police Lab Record Sheet B

Subject Tested
Sex
Age
Weight
Height
Weight Status

Vital Signs at Rest
Systolic Pressure
Diastolic Pressure
Heart Rate
Breathing Rate

Robot Test Results					
Substance	Exercise		Blood Pressure	Heart Rate	Breathing Rate
	Type	Time			

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LOADING DISKS / KEYBOARD GUIDE

To load ***The Human Body: Circulation and Respiration***, first turn on the monitor but not the computer. With your thumb on the disk label and the label facing up, insert the disk into the disk drive, oval cutout first. Then close the disk drive door and turn on the computer. The red light will come on, and the disk will whir. In a few seconds the title screens will appear.

If nothing happens, check that the disk is positioned properly (label up). Make sure that the monitor is plugged into the computer and that all other connections are secure. Make sure the computer and monitor are plugged into an active power source. Then repeat the loading instructions.

After the series title screen appears, you are asked to remove the disk from the disk drive. Turn the disk over, place it in the disk drive, close the drive door, and press RETURN to continue. The program title screen will appear and automatically advance after a few seconds. Enter your name and press RETURN. The next screen asks if you have a rank from a previous assignment. If you enter Y, you must enter the correct code obtained after completing the previous assignment. The next screen offers the option of sound in the program. After pressing RETURN, the Main Menu appears. You are now ready to select one of the sections of the program.

KEYBOARD GUIDE
THE HUMAN BODY: CIRCULATION AND RESPIRATION

USE	TO
RETURN	Advance a screen or lock an entry into place
ESC	Back up in the Police Lab or return to a previous menu
SPACE BAR	Move highlight box to your selection
ARROW KEYS	Move highlight on the Control Panel in the Police Lab
LETTER KEYS (A–Z)	Enter a name Enter a rank code Enter information in the Police Lab
NUMBER KEYS (0–9)	Enter statistics for heart rate, breathing rate, and blood pressure

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CARE OF DISKS

DON'T

Don't touch the disk surface; hold the disk only by the label.

Don't bend it, fold it, or get it wet.

Don't use paper clips on it.

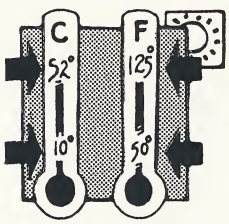
Don't place it on top of the monitor or on top of the disk drive.

Don't write on its label with a ballpoint pen or a pencil; use a felt-tipped pen with light pressure.

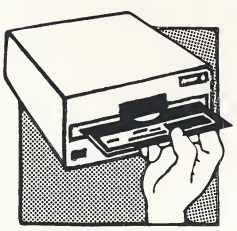
Don't put it where magnetic fields may damage it.

DO

Do keep it in the protective envelope when it's not in use.



Do store it at 10°C to 52°C (50°F to 125°F) and keep it out of direct sunlight.



Do insert it into the disk drive carefully, with the label up and facing you.

Do keep it away from chalkboards and other dusty areas.

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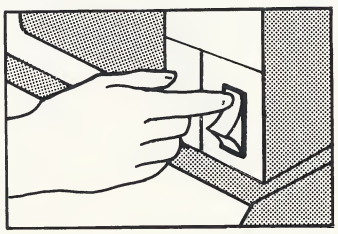
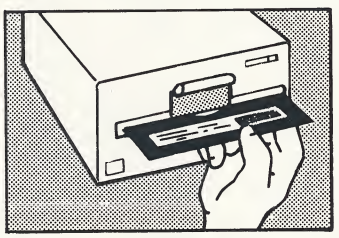
QUICK START

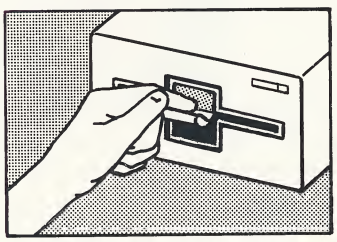
Apple® II Plus, IIe, IIc, or IIGS



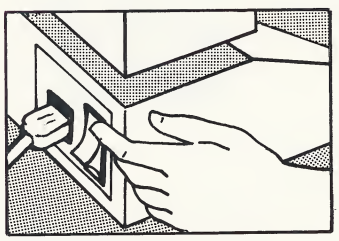
Turn on monitor.



Insert disk into disk drive, label side up.



Close disk drive door.



Turn on computer.

A B C D E F G H I J ESP 98 97 96 95 94 93 92 91 90 89

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ISBN 0-382-13399-4

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